Energy Recourses in Japan

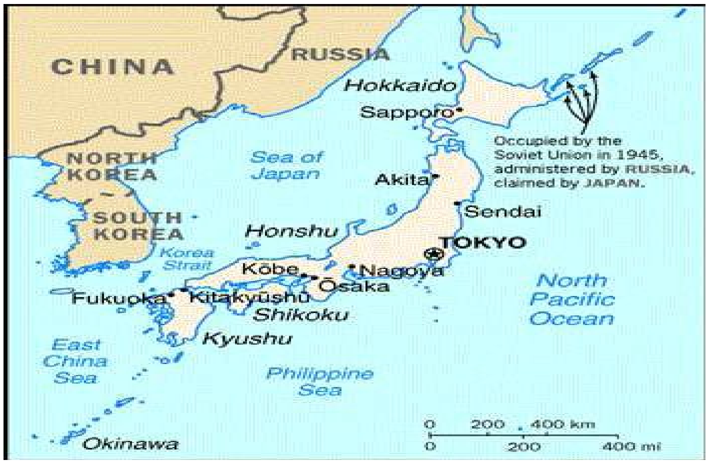
This study uses optimization modeling to study efficient ways to integrate renewable energy systems to provide electricity and heat in rural Japan. The model provides minimum cost system configuration and operation taking into account hour-by-hour energy availability and demand

renewable electricity can be provided by a combination of wind, photovoltaic, and biomass. Heat can be provided by petroleum, LPG, and geothermal heat pumps (GHPs). We find that due to the relatively high cost of grid electricity, there is significant penetration of wind generation. In turn, the penetration of wind creates economic conditions that encourage GHP penetration.

Japan has virtually no domestic oil or natural gas reserves and is the second-largest net importer of crude oil and largest net importer of liquefied natural gas in the world. Including nuclear power, Japan is still only 16 percent energy self-sufficient. Japanese companies have actively pursued upstream oil and natural gas projects overseas in light of the country's lack of domestic hydrocarbon resources. Japan remains one of the major exporters of energy-sector capital equipment and Japanese companies provide engineering, construction, and project management services for energy projects around the world. Japan has a strong energy research and development program that is supported by the government. The Japanese government actively pursues energy efficiency measures in an attempt to increase the country's energy security and reduce carbon dioxide emissions.

Japan is the third largest oil consumer in the world behind the United States and China, and the second largest net importer of oil.

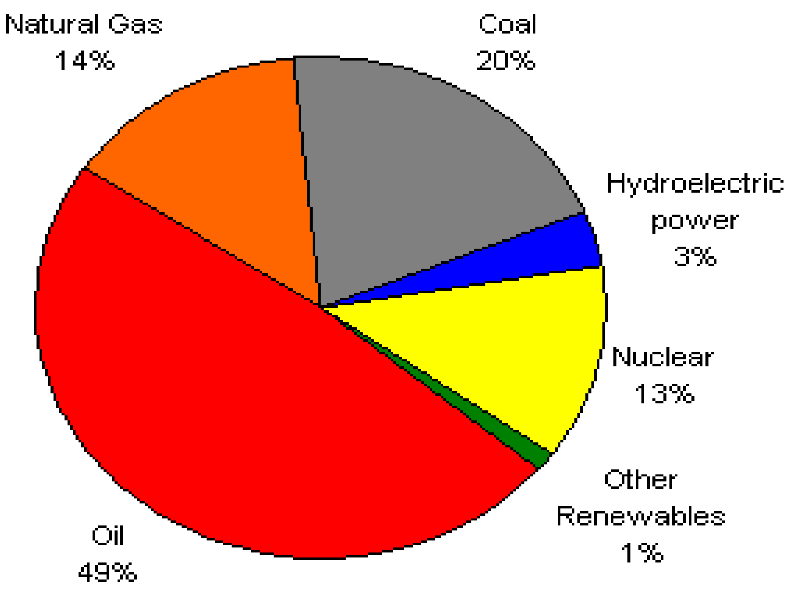
http://www.eia.doe.gov/cabs/Japan/pdf.pdf


CHINA
RUSSIA
Hokkaido
Sapporo
NORTH KOREA
SOUTH KOREA
Sea of Japan
Akita
Sendai
Honshu
TOKYO
Korea Strait
Kōbe
Nagoya
Ōsaka
Fukuoka
Kitakyūshū
Shikoku
Kyushu
North Pacific Ocean
East China Sea
Philippine Sea
Okinawa
Occupied by the Soviet Union in 1945, administered by RUSSIA, claimed by JAPAN.
0 200 400 km
0 200 400 mi

Oil is the most consumed energy resource in Japan, although its share of total energy consumption has declined by about 30 percent since the 1970s

Japan is the third largest consumer of nuclear power
in the world, after the United States and France. Hydroelectric power and renewable energy account for a
relatively small percentage of total energy consumption in the country. Total energy consumption from 2003
to 2030 is forecast to grow by 0.3 percent per year on average, relatively small as compared to China's
forecast growth rate of 4.2 percent per year on average according to EIA data.

Total Energy Consumption in Japan, by Type (2005)



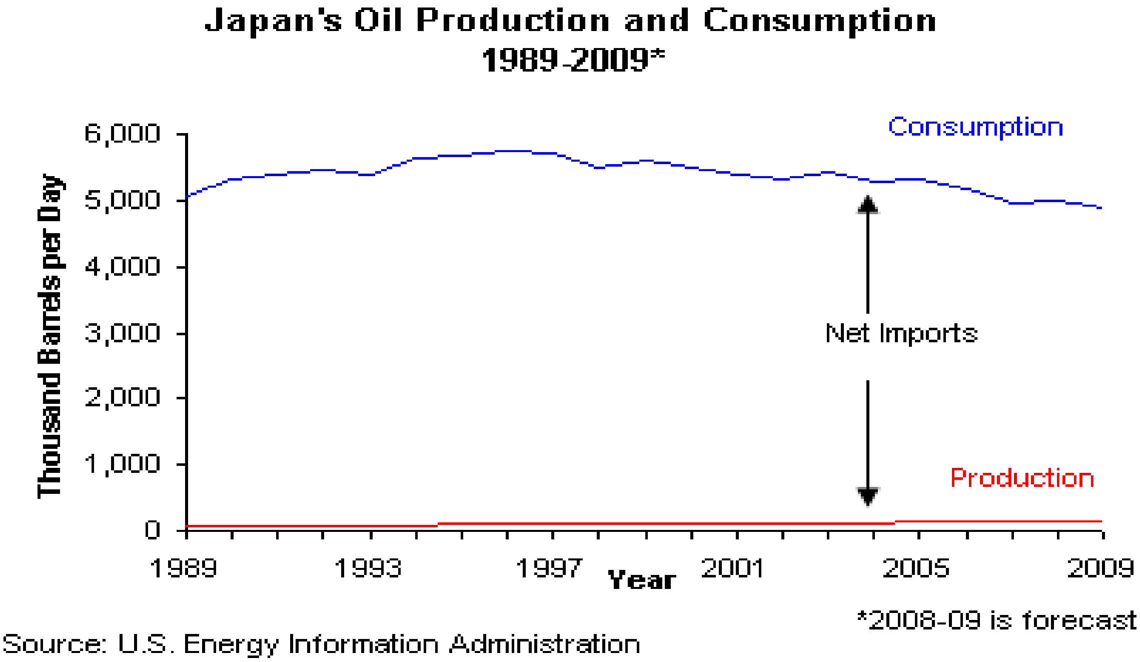
Source: EIA International Energy Annual 2005

Oil

Japan is the third-largest oil consumer in the world, in spite of its limited domestic oil reserves and production.

Japan has very limited domestic oil reserves and relies almost totally on imports to meet its consumption
needs. As of January 2008, Oil & Gas Journal (OGJ) estimated that Japan held approximately 40 million
barrels of proven oil reserves. In 2007, Japan's total oil production, including refinery gain, was roughly

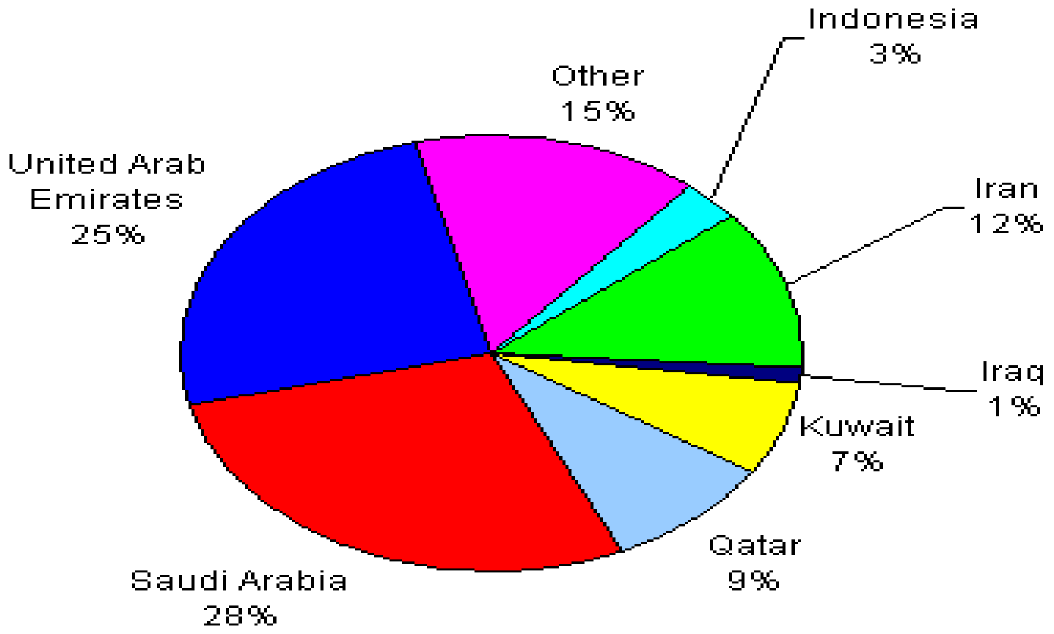
130,000 barrels per day (bbl/d), of which just 6,000 bbl/d was crude oil. Total oil production has historically trended upwards and is expected to increase slightly in 2008 and 2009. Japan has 145 producing oil wells in 13 fields, according to OGJ. The vast majority of Japan’s oil production comes in the form of refinery gain, resulting from the country’s large petroleum refining sector.



Japan's Oil Production and Consumption
1989-2009*

*2008-09 is forecast

Source: U.S. Energy Information Administration



Oil Imports by Source, Japan 2007

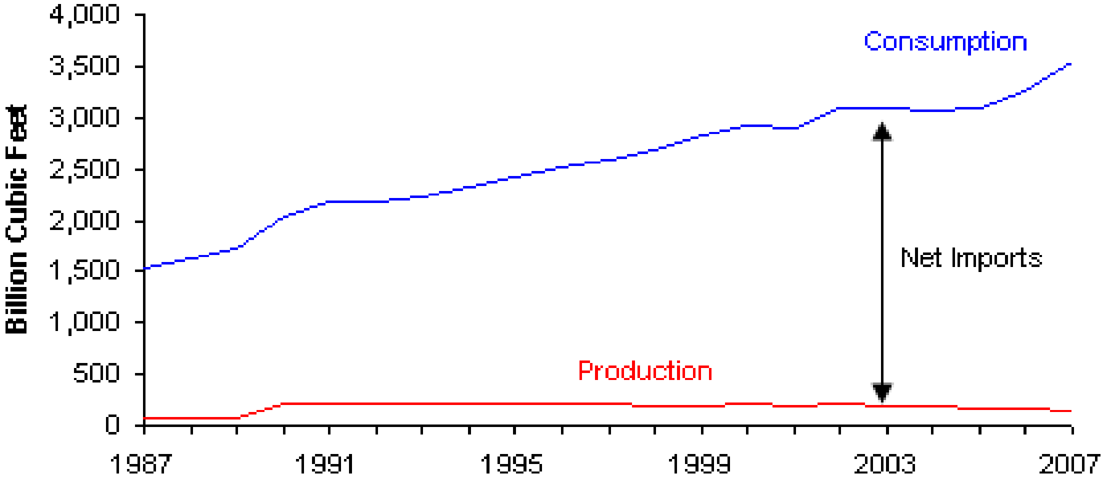
Source: International Energy Agency (IEA)

Natural Gas

Japan is the largest importer of liquefied natural gas in the world.

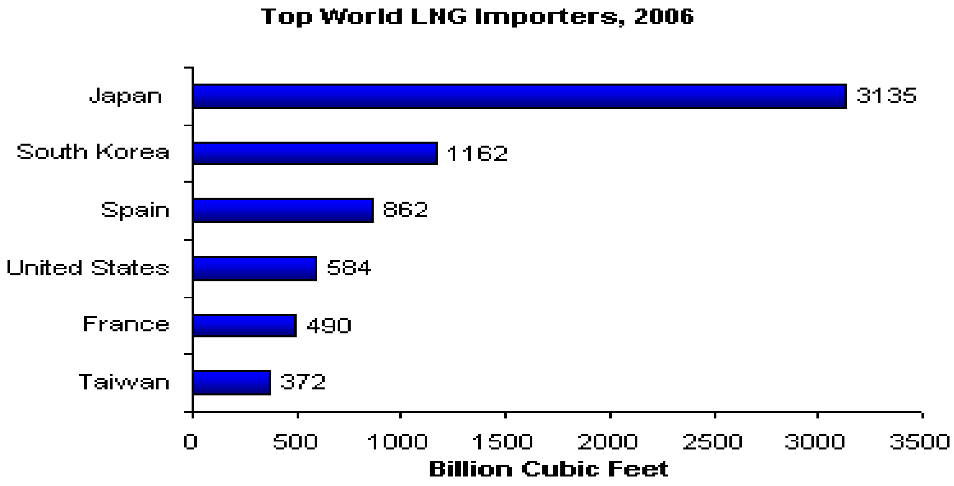
According to *Oil &Gas Journal (OGJ)*, Japan had 738 billion cubic feet (Bcf) of proven natural gas reserves as of January 2008. Natural gas proven reserves have declined since 2007, when they measured 1.4 trillion cubic feet (Tcf), according to *OGJ*. According to preliminary data, Japan produced 132 Bcf of natural gas in 2007, down slightly from 174 Bcf in 2006.

Japan's Natural Gas Production and Consumption, 1987-2007



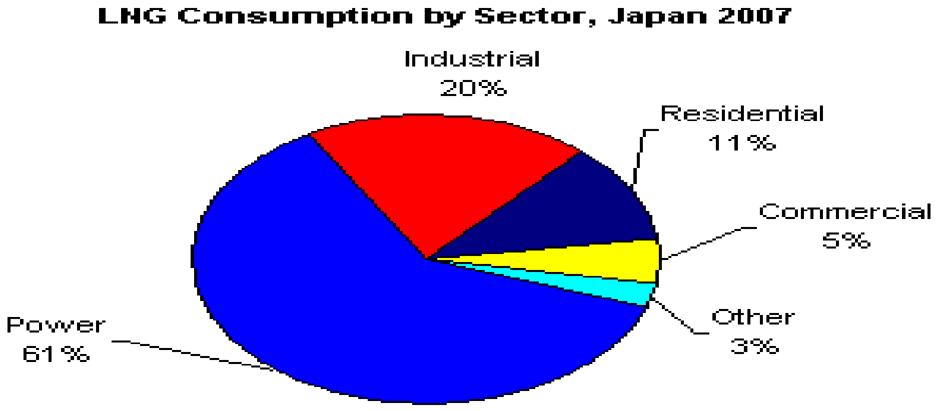
Source: U.S. Energy Information Administration

Despite limited natural gas resources, Japan is a large natural gas consumer and must rely on imports for virtually all of its natural gas needs. Lacking international pipeline connections, today Japan is the largest importer of liquefied natural gas (LNG) in the world and currently accounts for about 40 percent of global LNG imports

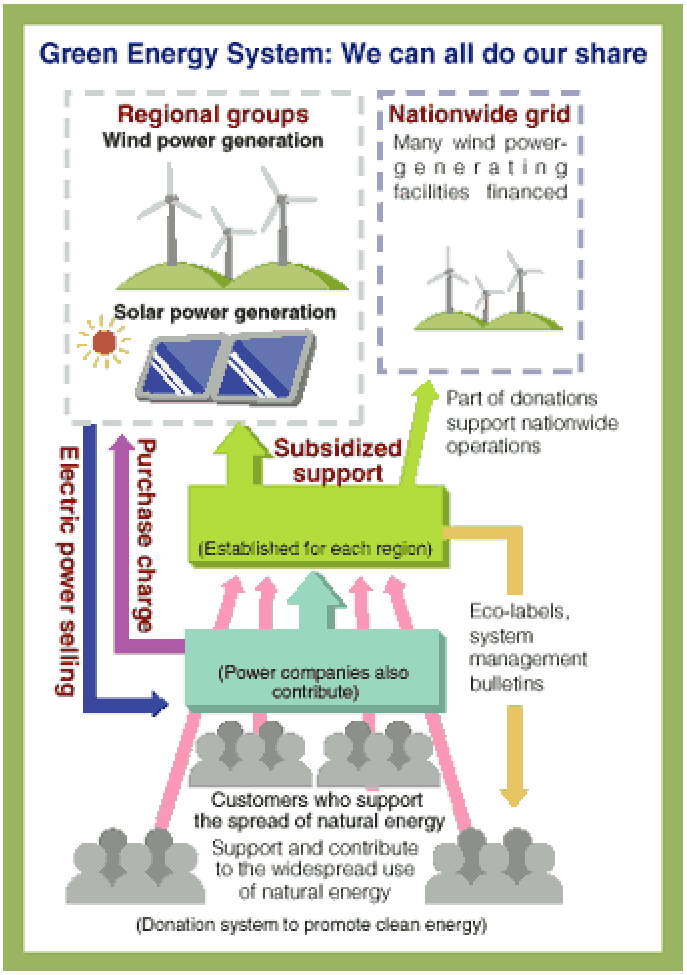


Source: U.S. Energy Information Administration

LNG consumption is on the rise in order to make up for fuel-substitution in the industrial sector, lower hydropower capacity, and lower nuclear power capacity, down 17 percent because of maintenance shutdowns and severe earthquake-related damages, according to industry reports. The power sector is the largest consumer of LNG, followed by the industrial sector. Increased use of natural gas within these sectors has been one of the main drivers of growth in natural gas demand in Japan.



Source: FACTS Global Energy Gas Insights, March 2008


Green Energy System: We can all do our share
Regional groups
Wind power generation
Solar power generation
Nationwide grid
Many wind power-generating facilities financed
Part of donations support nationwide operations
Subsidized support
(Established for each region)
Electric power selling
Purchase charge
Eco-labels, system management bulletins
(Power companies also contribute)
Customers who support the spread of natural energy
Support and contribute to the widespread use of natural energy
(Donation system to promote clean energy)

Thermal Power

Initially Japan used coal for thermal power generation, followed later by a reliance on oil. Today, a diverse range of fuels including coal, oil and liquefied natural gas (LNG) are used and still fulfill an important role in generating facilities. In particular, recently, in response to global environmental concerns to lower the amount of CO2 emissions, the use of LNG is being encouraged.

In efforts to enhance thermal efficiency further, combined-cycle generating systems using a gas turbine and a steam turbine are being introduced. As a result, gains in thermal efficiency have reached 49%. In the future, thermal efficiency gains will exceed 50% by means of an ultra-efficient gas turbine, while other promising new technologies such as coal gasification in combined power generating systems will continue to be developed.

Renewable Energy Sources

Japan’s government drafted a plan in May 2005 to boost wind power generation to 3 million kilowatts in the five years to March 2011. As of March, Germany had 14.61 million kilowatts, the U.S. 6.35 million kilowatts and Japan 1.07 million kilowatts. Power from Germany’s 17,600 wind turbines can meet about 6 percent of the nation’s demand.

http://www.alternative-energy-news.info/japan-wind-power-project-threatened/

Promotion of research, diffusion and commercialization of renewable energy sources friendly to the environment.

http://www.japannuclear.com/nuclearpower/program/sources.html

Water shortage in Japan

Water Shortages

1. After the water shortage during the Tokyo Olympics (1964), a large-scale water shortage has occurred about once in 10 years.
2. Recently, the nationwide water shortage in 1994 affected about 16 million people due to troubles in tap water supply, while causing damage to agriculture with product losses of roughly 140 billion yen.